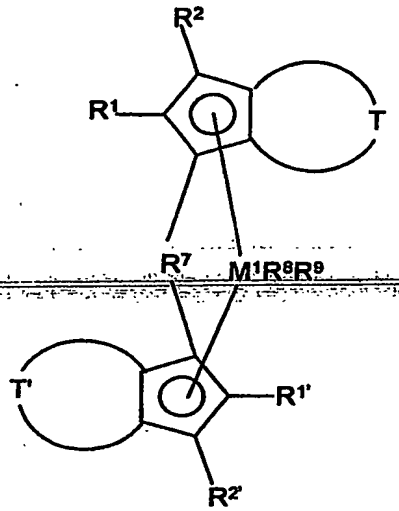
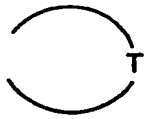
We claim:

1. A transition metal compound of the formula (I)

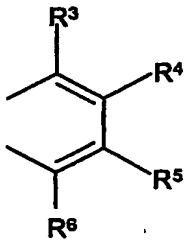


(I)

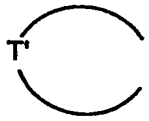
where



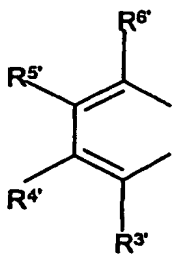
is

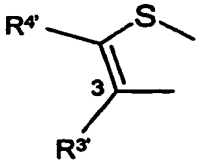


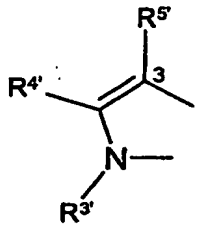
and



is a divalent group such as







and

M^1 is titanium, zirconium or hafnium;

R^1,R^2 are identical or different and are each a C_1-C_{20} group;

$R^{1'}$,$R^{2'}$ are identical or different, identical to or different from R^1 or R^2 and are each hydrogen or a C_1-C_{20} group;

R^3 is a C_6-C_{18}-aryl group or C_4-C_{18}-heteroaryl; or a fluorinated C_6-C_{20}-aryl or C_7-C_{20}-alkylaryl, where the aryl part of these groups may bear one or more linear or branched C_1-C_{18}-alkyl, C_1-C_{18}-alkoxy, C_2-C_{10}-alkenyl or C_3-C_{15}-alkylalkenyl groups as substituents, or R^3 together with R^4 forms a monocyclic or polycyclic ring system which may in turn be substituted;

$R^{3'}$ is hydrogen or a C_1-C_{40} group or $R^{3'}$ together with $R^{4'}$ forms a monocyclic or polycyclic ring system which may in turn be substituted;

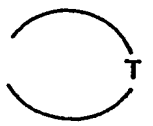
R^4,$R^{4'}$ are identical or different and are each hydrogen or a C_1-C_{20} group;

R^5,$R^{5'}$,R^6,$R^{6'}$ are identical or different and are each hydrogen or a C_1-C_{20} group;

R^7 is a bridging structural element between the two indenyl radicals and is selected from the $M^2R^{10}R^{11}$ group, where M^2 is silicon, germanium, tin or carbon and R^{10} and R^{11} may be identical or different and are each hydrogen or a C_1-C_{20}-hydrocarbon-containing group;

R^8,R^9 may be identical or different and are each halogen, linear or branched C_1-C_{20}-alkyl, substituted or unsubstituted phenoxide, or R^8 and R^9 are joined to one another and form a monocyclic or polycyclic ring system which may in turn be substituted.

2. A transition metal compound as claimed in claim 1, wherein



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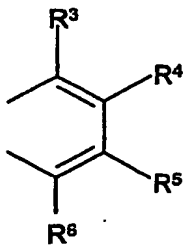

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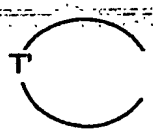

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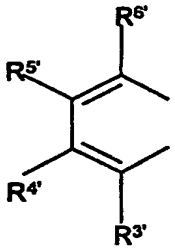


where the substituents R^3 to R^6 and $R^{3'}$ to $R^{6'}$ are defined as for formula (I).

3. A transition metal compound as claimed in claim 1 or 2, wherein

M^1 is zirconium;

R^1,R^2 are identical or different and are each a C_1-C_{12}-alkyl group;

$R^{1'}$,$R^{2'}$ are identical or different and are each hydrogen, methyl, ethyl, n-propyl, isopropyl, n-butyl, isobutyl, tert-butyl, cyclopentyl or cyclohexyl;

R^3,$R^{3'}$ are identical or different and are each a C_6-C_{18}-aryl group or two radicals R^3 together with R^4 and/or $R^{3'}$ together with $R^{4'}$ may form a monocyclic or polycyclic ring system which may in turn be substituted, and $R^{3'}$ may also be hydrogen;

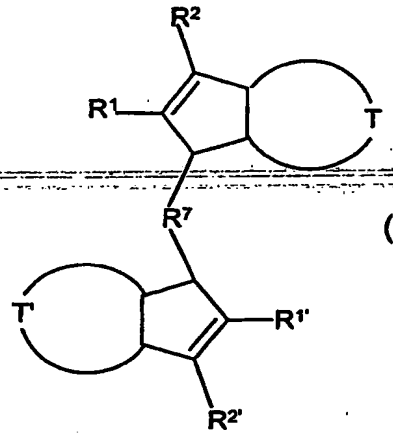
R^4,$R^{4'}$ are identical or different and are either hydrogen or R^4 together with R^3 and/or $R^{4'}$ together with $R^{3'}$ form a monocyclic or polycyclic ring system;

R^5,$R^{5'}$,R^6,$R^{6'}$ are identical or different and are each hydrogen, linear or branched C_1-C_{18}-alkyl, C_2-C_{10}-alkenyl or C_3-C_{15}-alkylalkenyl; C_6-C_{20}-aryl, C_4-C_{18}-heteroaryl, C_7-C_{20}-arylalkyl; or fluorinated C_1-C_{12}-alkyl, C_2-C_{10}-alkenyl, C_6-C_{20}-aryl or C_7-C_{20}-arylalkyl;

R^7 is a bridging structural element $SiR^{10}R^{11}$ and R^{10} and R^{11} are identical or different and are each a C_1-C_{20}-hydrocarbon-containing group and

R^8,R^9 are each chlorine or methyl.

4. A ligand system of the formula (II) or its double bond isomers,

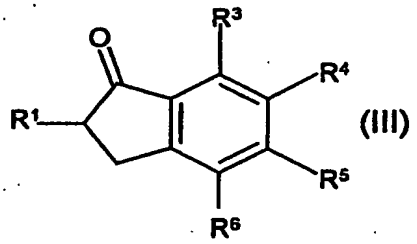


(II)

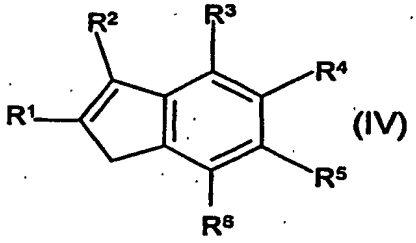
where the variables are as defined for formula (I).

5. A process for preparing ansa-metallocenes of the formula (I), which comprises the following steps:

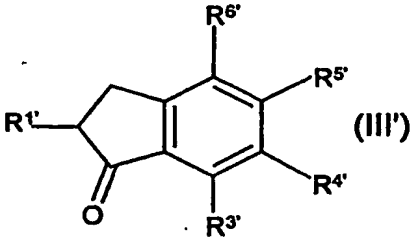
a) reaction of a 1-indanone of the formula (III) or (III') with an organometallic compound $M^3R^2_mHal_n$ or $M^3R^{2'}_mHal_n$ and subsequent elimination to form the substituted indene of the formula (IV) or (IV'),



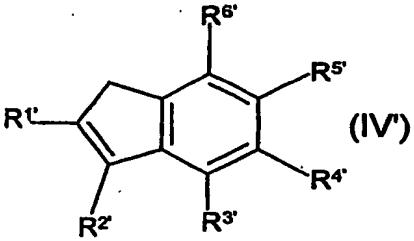
(III)



(IV)



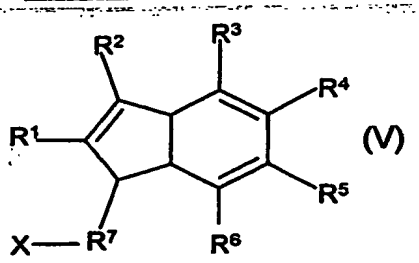
(III')



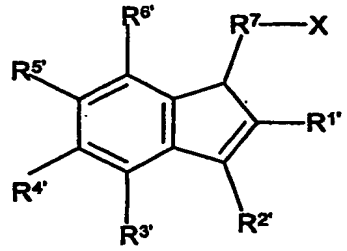
(IV')

where the variables R^1, $R^{1'}$, R^2, $R^{2'}$, R^3, $R^{3'}$, R^4, $R^{4'}$, R^5, $R^{5'}$, R^6 and $R^{6'}$ are as defined for formula (I), M^3 is an alkali metal, an alkaline earth metal, aluminum or titanium, Hal is halogen, m is an integer and is equal to or greater than 1 and the sum of m+n corresponds to the valence of M^3;

b) deprotonation of the substituted indene of the formula (IV) or (IV') and subsequent reaction of the deprotonated indene with compounds of the type R^7X_2 to form compounds of the formula (V) or (V') or their double bond isomers,



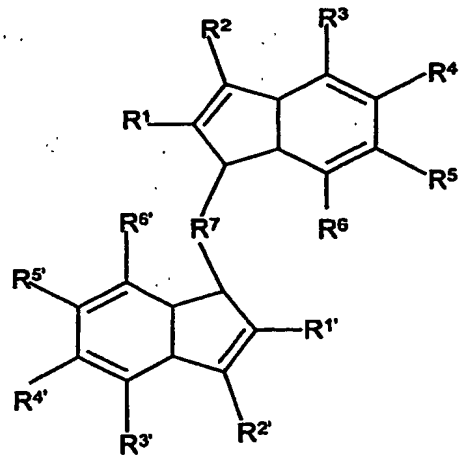
(V)



(V')

where X is Cl, Br, I or O-tosyl and R^7 is as defined for formula (I);

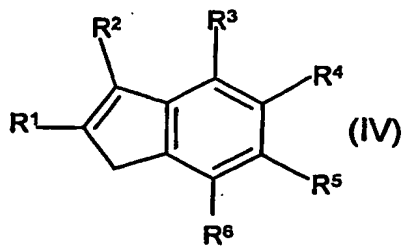
c) reaction of the compound of the formula (V) or (V') with a further deprotonated indene which has been obtained by deprotonation of (IV) or (IV') to form the ligand system of the formula (IIa) or its double bond isomers,



(IIa)

d) deprotonation of the ligand system of the formula (IIa) or its double bond isomers and reaction with compounds of the type $X_2M^1R^8R^9$ to give the ansa-metallocene of the formula (I), where X is as defined for formula (V) and M^1, R^8 and R^9 are as defined for formula (I).

6. An indene of the formula (IV) or its double bond isomer,



(IV)

where

R^1,R^2 are identical or different and are each a C_1-C_{20} group;

R^3 is a C_6-C_{18}-aryl group or C_4-C_{18}-heteroaryl; or a fluorinated C_6-C_{20}-aryl or C_7-C_{20}-alkylaryl, where the aryl part of these groups may bear one or more linear or branched C_1-C_{18}-alkyl, C_1-C_{18}-alkoxy, C_2-C_{10}-alkenyl or C_3-C_{15}-alkylalkenyl groups as substituents;

R^4 is hydrogen or a C_1-C_{20} group;

R^5, R^6 are identical or different and are each hydrogen or a C_1-C_{20} group.

7. A catalyst system comprising one or more compounds of the formula (I) as claimed in any of claims 1 to 3 and one or more cocatalysts and/or supports.

8. The use of a catalyst system as claimed in claim 7 for the preparation of a polyolefin, in particular a copolymer of various olefins.

9. The use of a compound of the formula (I) as claimed in any of claims 1 to 3 for the preparation of a polyolefin, in particular a copolymer of various olefins.

10. The use as claimed in claim 8 or 9 for the preparation of ethylene-propylene copolymers.

11. A process for preparing a polyolefin by polymerization of one or more olefins in the presence of one or more compounds of the formula (I) as claimed in any of claims 1 to 3.